CLAIMS:

1. In a method for a specific binding assay to determine a target moiety which is a member of a specific binding pair, the improvement comprising using a detectable label which is a fusion protein containing a phycobiliprotein domain and another domain corresponding to a first member of a specific binding pair, wherein the fusion protein binds to a second member of the specific binding pair to provide a detectable labeled complex.

2. The method of claim 1, wherein the fusion protein contains two or more copies of the domain corresponding to the first member of the specific binding pair.

3. The method of claim 1, wherein the fusion protein also contains a domain corresponding to a member of another specific binding pair, such that the fusion protein is a multivalent, labeled, binding moiety.

4. The method of claim 1, wherein the specific binding assay includes a second fluorescent reagent having a spectrum different from the spectrum of the phycobiliprotein domain, such that, on interaction between the domain corresponding to the first member of the specific binding pair and the second member of the specific binding pair, a detectable change in fluorescence occurs.

5. The method of claim 4, wherein the detectable change in fluorescence is quenching of the phycobiliprotein domain fluorescence.

6. The method of claim 4, wherein the detectable change in fluorescence is a change in the phycobiliprotein domain fluorescence.

7. The method of claim 4, wherein the detectable change in fluorescence is a transfer of fluorescent energy from the phycobiliprotein domain to the second fluorescent reagent, resulting in fluorescence emission from the second fluorescent reagent.

8. The method of claim 4, wherein the detectable change in fluorescence is a transfer of fluorescent energy from the second fluorescent dye to the phycobiliprotein domain, resulting in fluorescence emission coming from the phycobiliprotein domain.

9. The method of claim 1, wherein the specific binding assay is an immunoassay, said specific binding pair corresponding to an antibody-antigen pair.

10. The method of claim 1, wherein the specific binding assay is a receptor binding assay.

11. The method of claim 1, wherein the specific binding assay is a nucleic acid binding assay.

12. The method of claim 11, wherein the nucleic acid is DNA.

13. The method of claim 11, wherein the nucleic acid is RNA.

14. The method of claim 11, wherein the nucleic acid is protein nucleic acid (PNA).

15. In a method for biologic activity assays to determine a particular entity which induces a known biologic effect, the improvement comprising using a detectable label which is a fusion protein containing a phycobiliprotein domain and a second domain which undergoes the known biologic effect upon encountering the particular entity, wherein the known biologic effect induces a detectable change in the fusion protein.

16. The method of claim 15, wherein the biologic activity assay is an assay for an enzyme, and the second domain serves as a substrate for the enzyme.

17. The method of claim 15, wherein the enzyme is a phosphokinase.

18. The method of claim 15, wherein the enzyme is a protease.

19. The method of claim 15, wherein the biologic activity assay detects a ribozyme, and the second domain is cleaved by the ribozyme.

20. A non-covalent complex comprising a first member of a specific binding pair non-covalently bound to a fusion protein containing a phycobiliprotein domain and a specific binding domain corresponding to a second member of the specific binding pair.

21. The complex of claim 20, wherein the fusion protein contains two or more copies of the domain corresponding to the second member of the specific binding pair.

22. The complex of claim 20, wherein the fusion protein also contains a domain corresponding to a member of another specific binding pair, such that the fusion protein is a multivalent, labeled, binding moiety.

23. The complex of claim 20, wherein the specific binding assay includes a second fluorescent reagent having a spectrum different from the spectrum of the phycobiliprotein domain, such that on interaction between the two specific binding domains a detectable change in fluorescence occurs.

24. The complex of claim 23, wherein the detectable change in fluorescence is quenching of the phycobiliprotein domain fluorescence.

25. The complex of claim 23, wherein the detectable change in fluorescence is a change in the phycobiliprotein domain fluorescence.

26. The complex of claim 23, wherein the detectable change in fluorescence is a transfer of fluorescent energy from the phycobiliprotein domain to the second fluorescent reagent, resulting in fluorescence emission from the second fluorescent reagent.

27. The complex of claim 23, wherein the detectable change in fluorescence is a transfer of fluorescent energy from the second fluorescent dye to the phycobiliprotein domain, resulting in fluorescence emission coming from the phycobiliprotein domain.

28. The complex of claim 20, wherein the specific binding assay is an immunoassay, said specific binding pair corresponding to an antibody-antigen pair.

29. The complex of claim 20, wherein the specific binding assay is a receptor binding assay.

30. The complex of claim 20, wherein the specific binding assay is a nucleic acid binding assay.

31. The complex of claim 30, wherein the nucleic acid is DNA.

32. The complex of claim 30, wherein the nucleic acid is RNA.

33. The complex of claim 30, wherein the nucleic acid is protein nucleic acid (PNA).

34. The complex of claim 20, wherein the fusion protein containing a phycobiliprotein domain comprises an antibody domain or cell surface domain.

35. The complex of claim 20, wherein the fusion protein containing a phycobiliprotein domain comprises a hapten or an antigen.

36. The complex of claim 20, wherein the complex comprises a fusion protein containing a phycobiliprotein domain which is bound to a cell, virus, subcellular organelle, prion or biological surface.

37. An isolated and purified fusion protein comprising a domain corresponding to a molecule of at least 2000 daltons molecular weight and a domain corresponding to a phycobiliprotein subunit.

38. The fusion protein of claim 37, wherein the molecule of at least 2000 daltons molecular weight is not found associated with phycobiliprotein in algae.

39. The fusion protein of claim 37, wherein the molecule of at least 2000 daltons molecular weight is not found naturally in algae.

40. A method of producing an isolated and purified fusion protein containing a phycobiliprotein domain and a non-phycobiliprotein domain, said method comprising

(1) culturing a recombinant cell transformed with a nucleic acid sequence encoding a phycobiliprotein subunit in reading frame with a nucleic acid sequence encoding a polypeptide domain so that the nucleic acid sequences are expressed as a fusion protein; and

(2) isolating said fusion protein so that it is separated from all other fluorescent moieties in the cell other than fluorescent moieties which may be part of a spontaneously forming complex containing the fusion protein.

41. The method of claim 40, wherein the recombinant cell is an algal cell, and the nucleic acid sequence encoding the non-phycobiliprotein domain is foreign to the algal cell.

42. In a method for screening a combinatorial library to determine moieties which recognize a specific target molecule, the improvement comprising using a detectable label which is a fusion protein containing a phycobiliprotein domain and another domain corresponding to the one member of a random peptide library,

wherein said labeled library is used to locate peptide-containing domains which bind to the target molecule.

43. A method of producing an isolated and purified fusion protein containing a phycobiliprotein and phycobiliprotein linker domain and a nonphycobiliprotein molecule domain, said method comprising

(1) culturing a recombinant cell transformed with a nucleic acid sequence encoding a phycobiliprotein linker in reading frame with a nucleic acid sequence encoding a polypeptide domain so that the nucleic acid sequences are expressed as a fusion protein, wherein said recombinant cell is not an algal cell;

(2) isolating said fusion protein,

(3) mixing said fusion protein with a plurality of phycobiliprotein subunits or phycobilisome subcomplexes missing the phycobiliprotein linker used in production of the fusion protein, and

(4) allowing these to form a complex with the phycobiliprotein linker fusion protein fitting into its proper position in the assembled phycobiliprotein or phycobilisome and/or subunits thereof.

44. An isolated and purified fusion protein comprising a domain corresponding to a nucleic acid binding domain and a domain corresponding to a phycobiliprotein and/or phycobiliprotein linker subunit.

45. An assay method using the fusion protein or protein complex ~~of claim~~ 44, wherein a synthetic oligonucleotide, having a recognition sequence for the nucleic acid binding domain in the fusion protein, binds to the reagent to form a non-covalent complex containing oligonucleotide bound to fluorescent label.

46. The method of claim ~~45~~, wherein said complex is allowed to hybridize to target nucleic acid complementary to said oligonucleotide such that hybridization of said target may be detected.